The Long Reach of Early Childhood: Biological & Environmental Influences

Jeanne Brooks-Gunn

Virginia & Leonard Marx Professor of Child Development,

Teachers College & the College of Physicians and Surgeons,

Columbia University

Lecture in honor of Matilda Riley
National Institutes of Health

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SECTION I.
WELL-BEING AND DISPARITIES

- *Childhood*
  - *Cognition & Schooling*
  - *Behavioral regulation*
  - *Health*

- *Adulthood*
  - *Earnings & Education*
  - *Crime & Mental Health*
  - *Morbidity & Mortality*

CHILDHOOD ADVERSITIES IN CAPITAL

- *Low family income*
  - *Poor is defined as bottom quartile of income distribution (over 20%)*[1]
  - *Near-poor is defined as second to bottom quartile (another 20%)*
- *Low parental education*
  - *Less than a high school education or only high school education*
  - *Bottom quartile or third of the education distribution for cohort*
- *Local or national economic conditions*

[1] Rates are higher for younger than older children, and for children whose parents have little education, are single, incarcerated, young themselves, immigrants, ethnic minorities

CHILDHOOD ADVERSITIES IN FAMILY LIFE

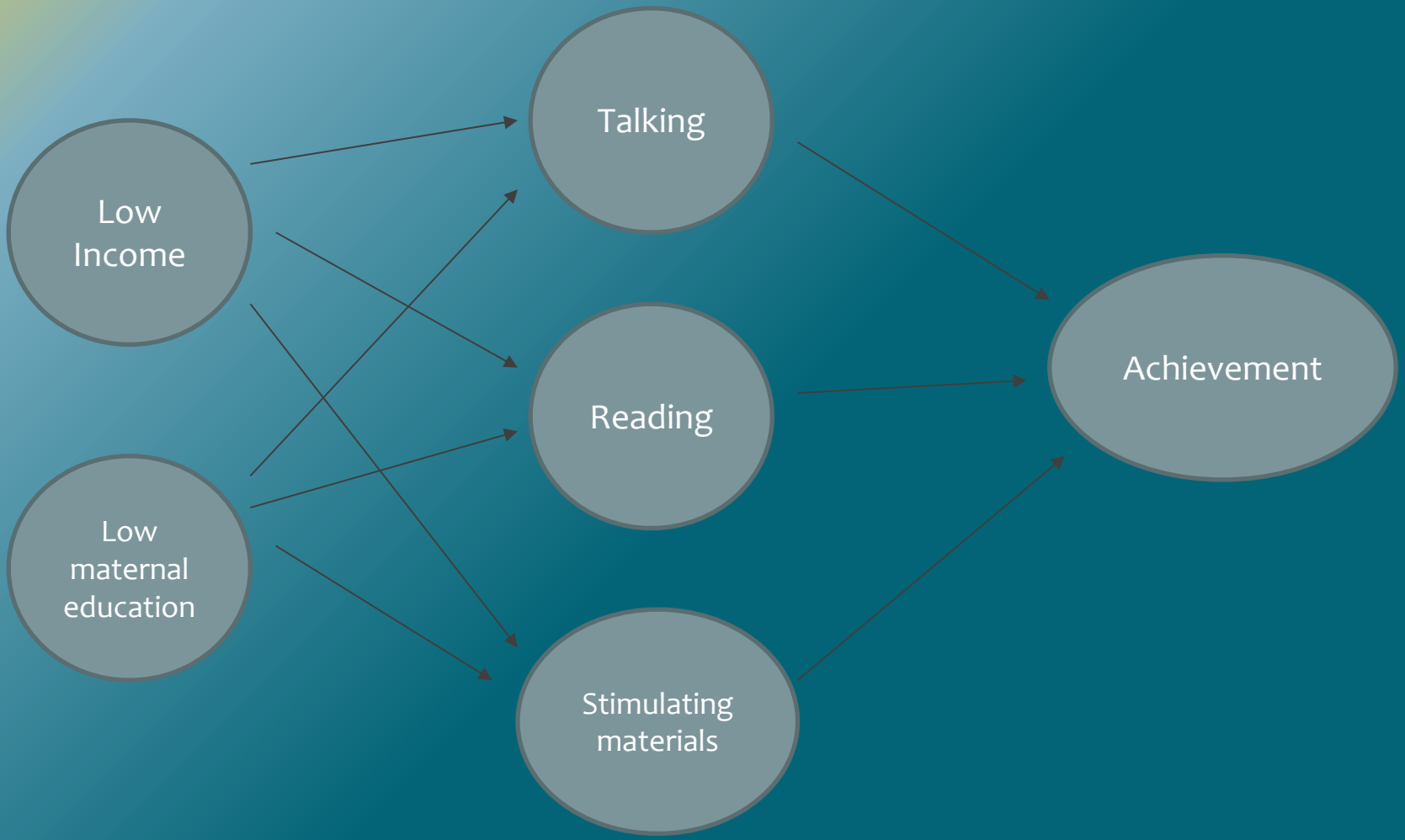
- *Emotional tenor of parent*
  - *harsh, disengaged, intrusive*
- *Emotional health of parent*
  - *perceived stress, anxiety, depression*
- *Provision of stimulating materials and experiences*
  - *little talking or few educational materials*
- *Violence*
  - *partner violence, neighborhood violence, incarceration*
- *Household turbulence*
  - *frequent moving, moving in and out of the house, high family conflict, chaos*

Also adequate nutrition, exercise, and health care

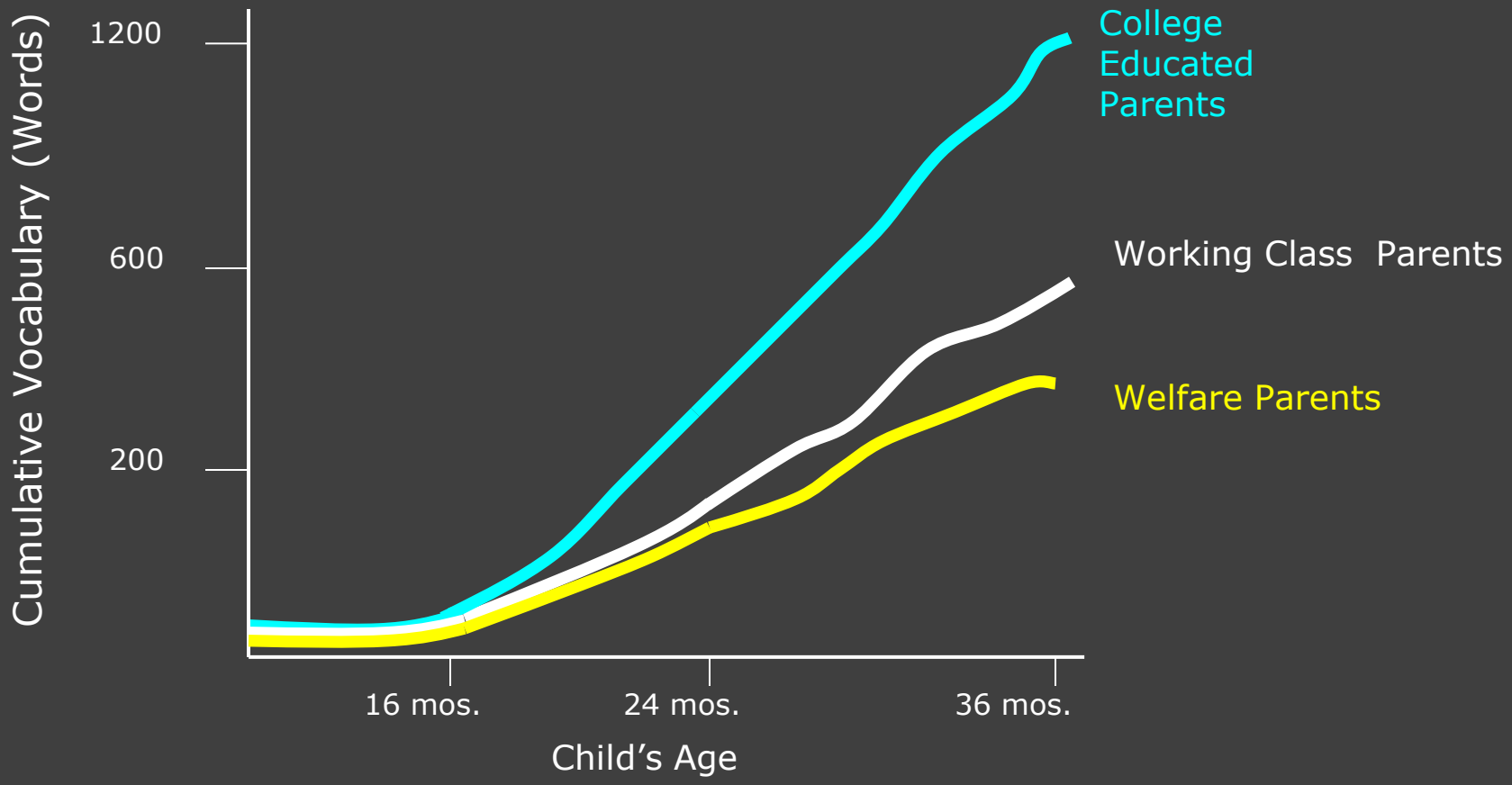
CHILDHOOD ADVERSITIES IN NEIGHBORHOOD

- *Census*
  - *Disadvantaged (poor, low education, employed, single parents)*
  - *Residential instability*
- *Police Reports*
  - *Violent crimes*
  - *Non-violent crimes*
- *Observation & Surveys*
  - *Low social cohesion*
  - *Physical disorder*
  - *Fear for safety*
  - *Low collective efficacy*

THE HUMAN CAPITAL MODEL

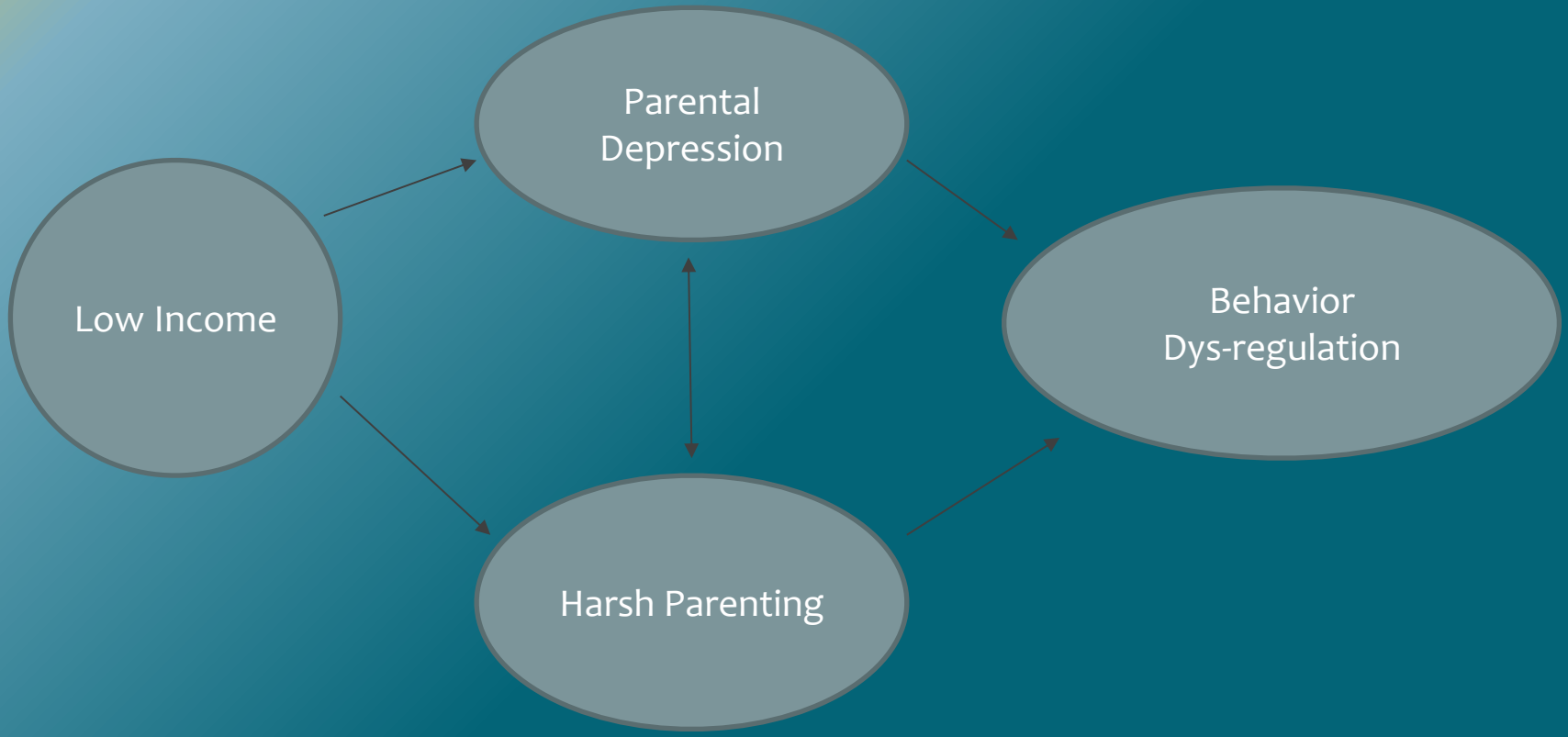


Disadvantage and Child Development



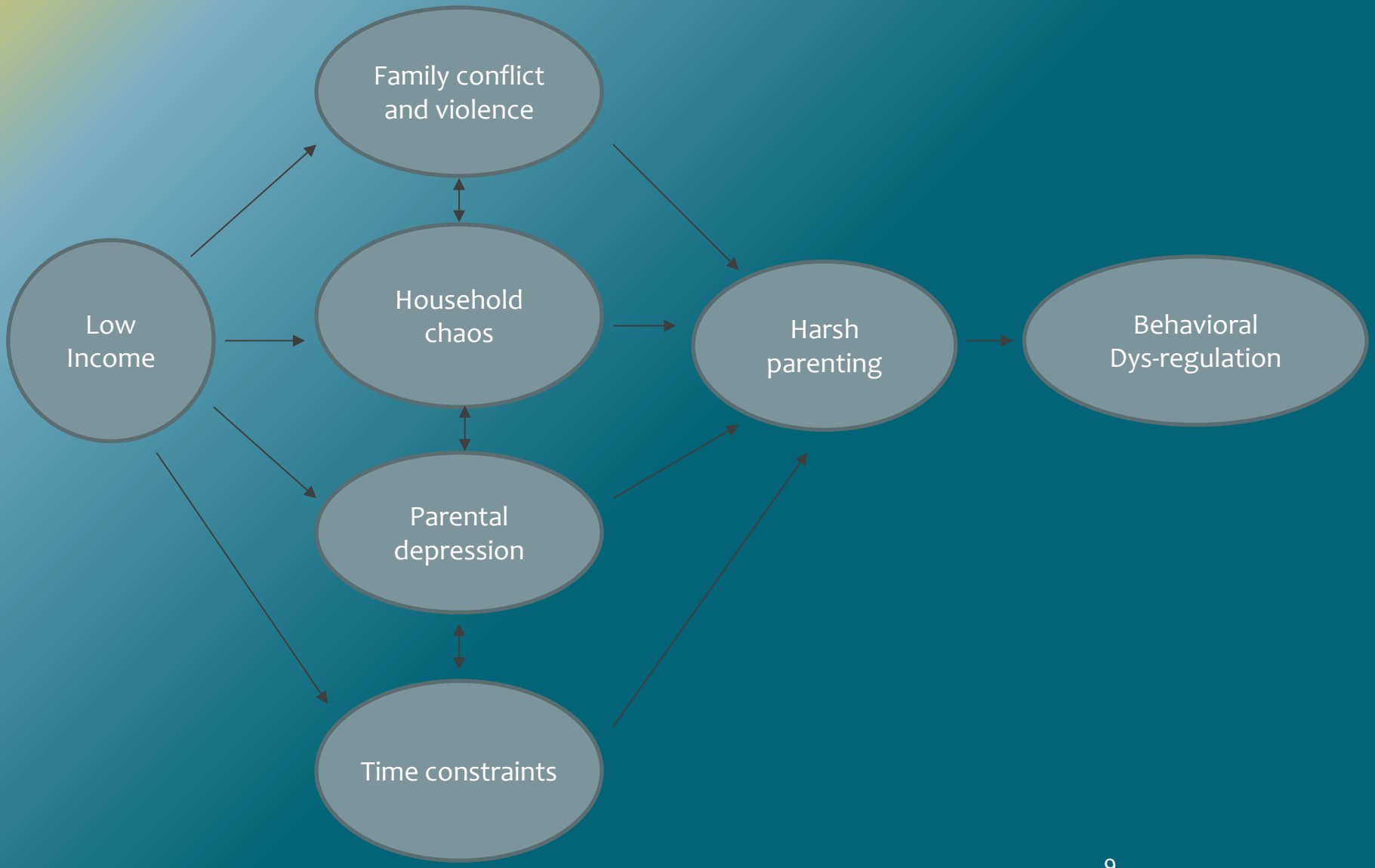
Hart & Risley, 1995

FAMILY STRESS MODEL



Models proposed by Elden and Conger. See also Yeung, Brooks-Gunn et al., 1999

BRINGING MORE FAMILY ADVERSITIES INTO MODEL



MacKenzie, Brooks-Gunn, et al., forthcoming

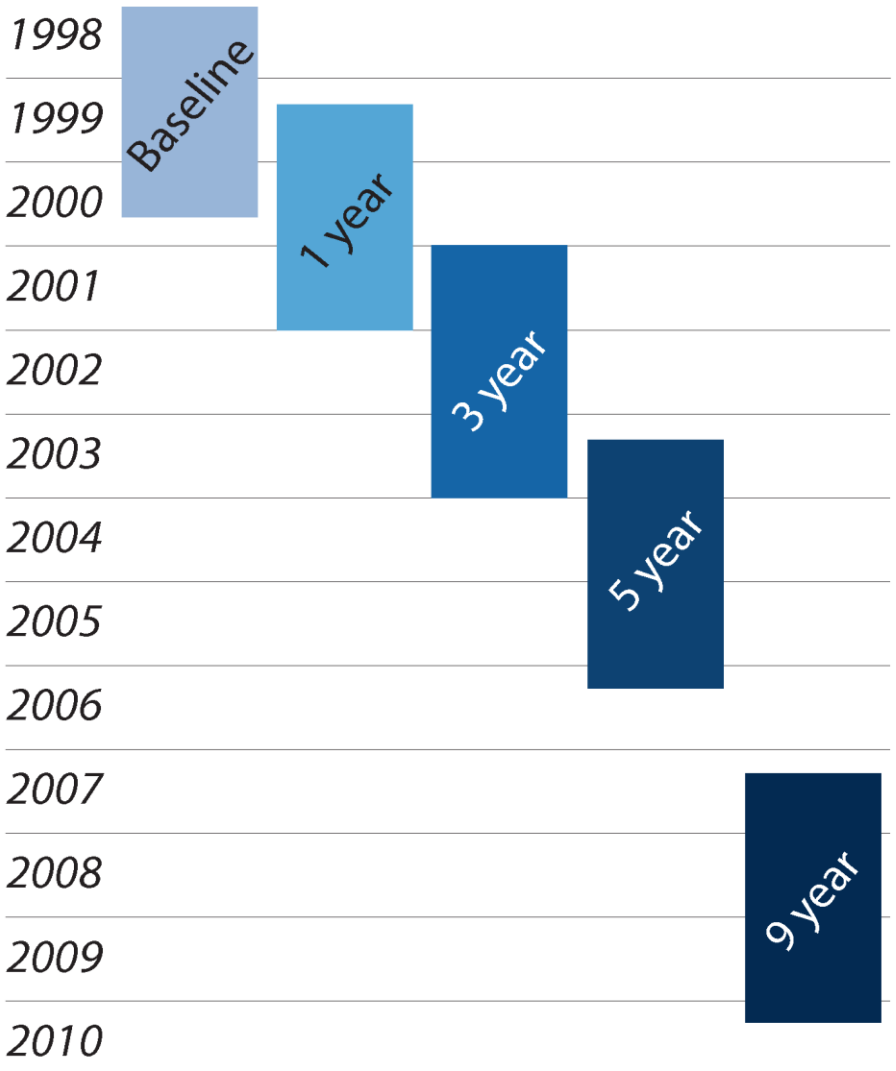
UNDERSTANDING IMPACT OF CHILDHOOD ADVERSITY

- *Upstream correlates and conditions*
- *Continuity and timing*
- *Cascades and reciprocal effects*
- *Heightened salience at various ages*
- *Cumulative risk*
- *Co-occurrence*
- *Biological processes as markers*
- *Biological processes as moderators*

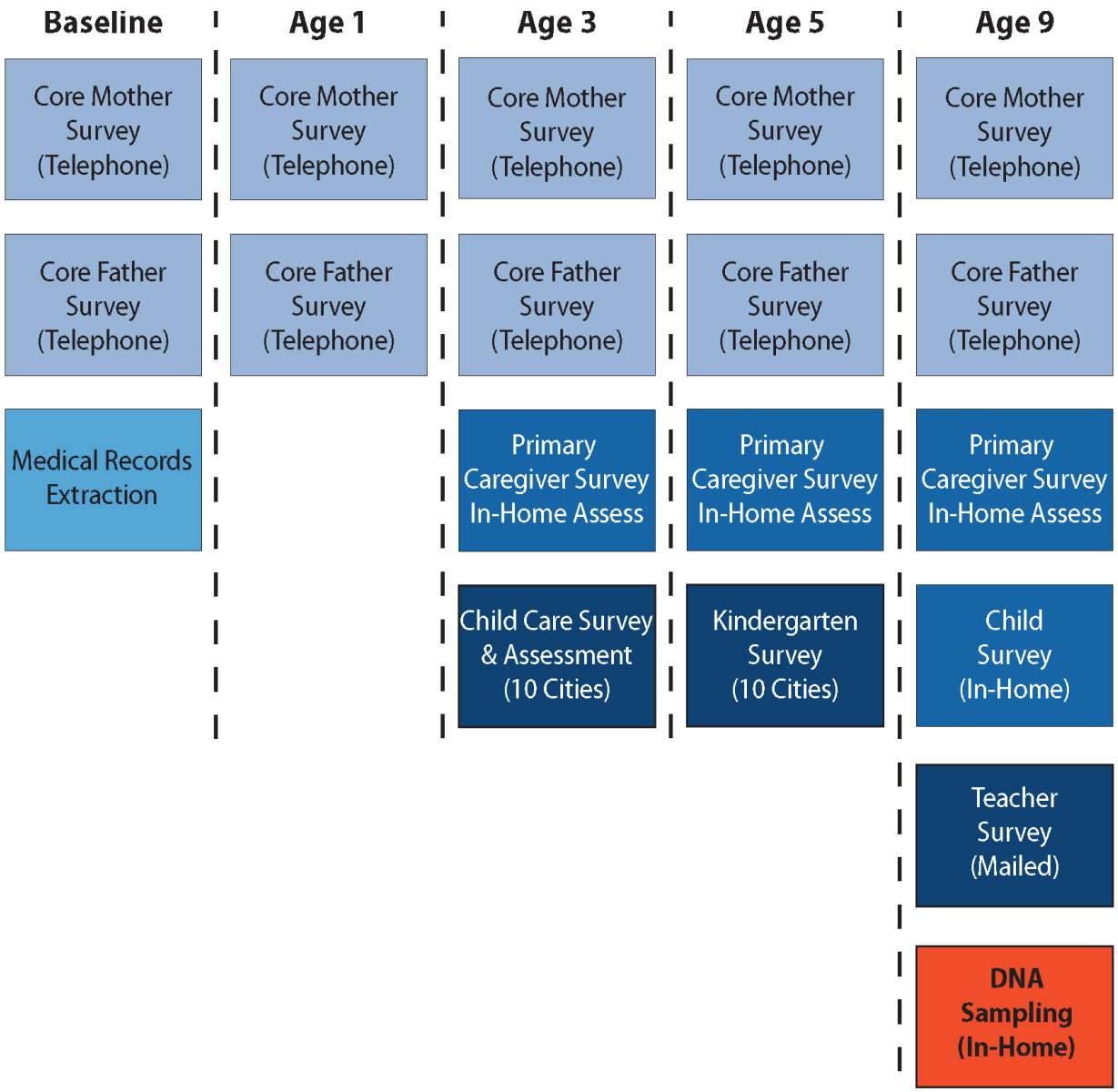
SECTION II FRAGILE FAMILIES AND CHILD WELL-BEING STUDY

- *Birth cohort through age 9*
- *Multi-method*
- *Probability sample of 4,898 births*
  - *20 U.S. cities (populations of 200,000 or more)*
  - *75 hospitals*
  - *Roughly 3,700 non-marital births; 1,200 marital births*

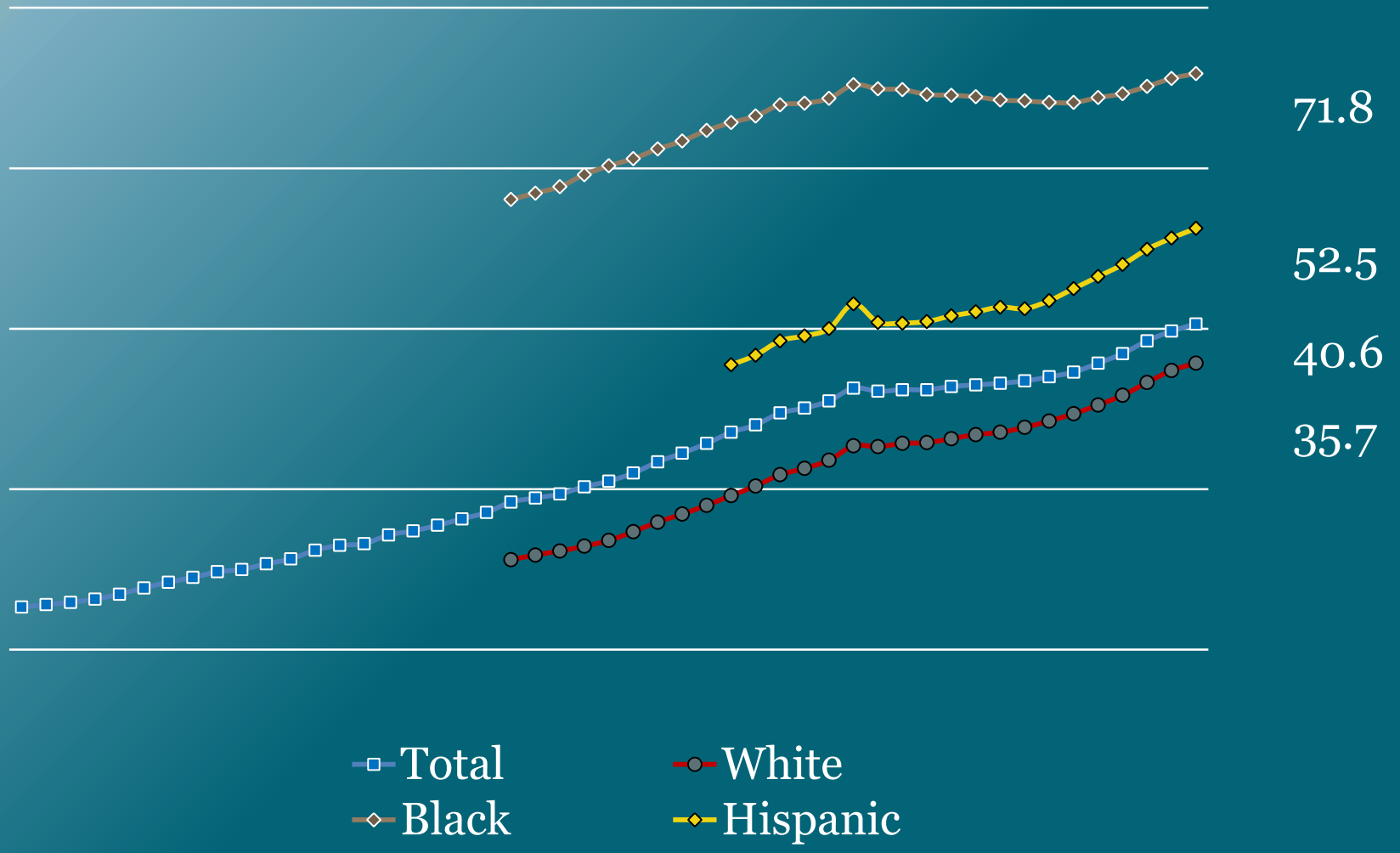
Fragile Families Timeline



Fragile Families Study Components

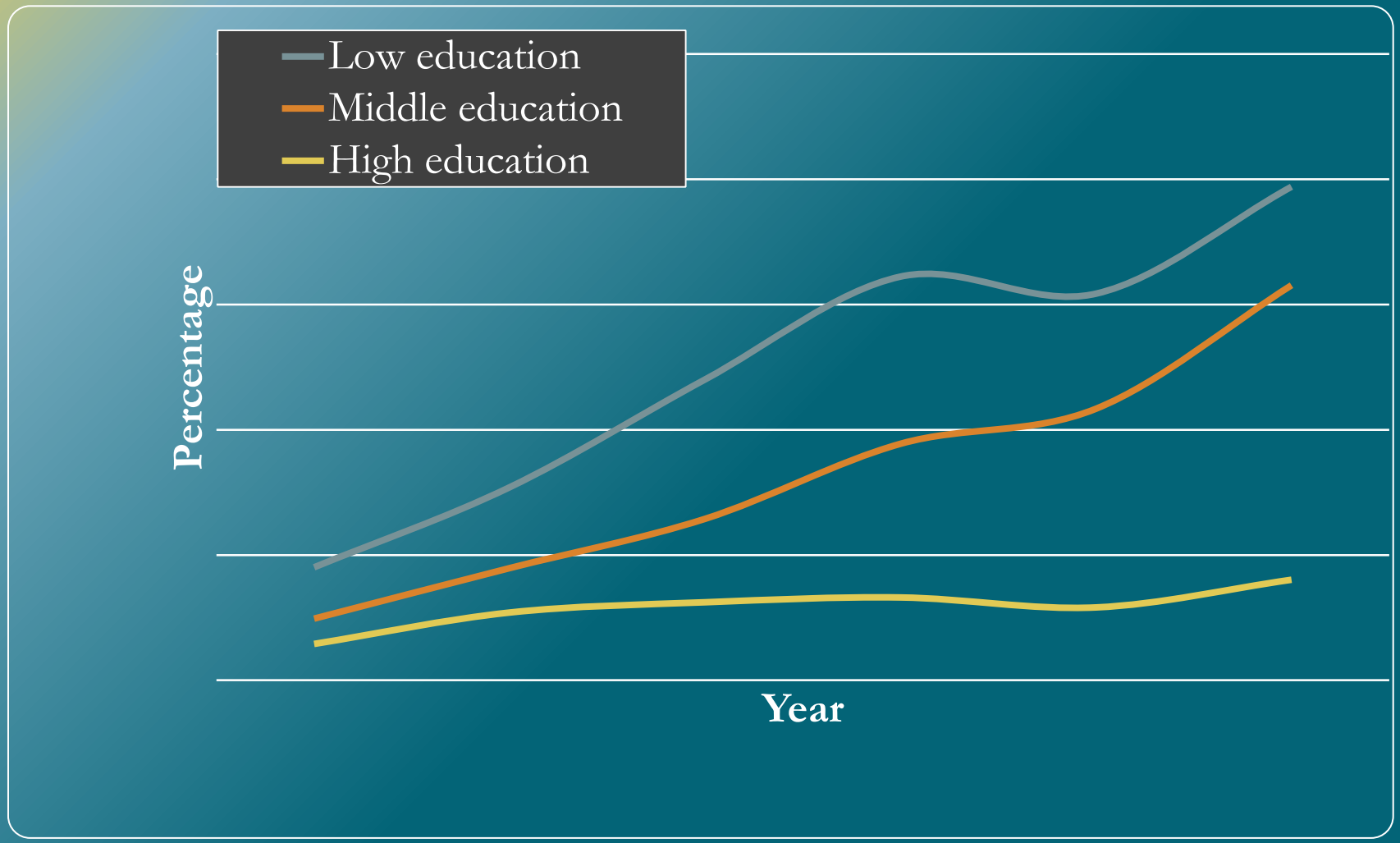


PERCENT OF BIRTHS TO UNMARRIED WOMEN IN THE US



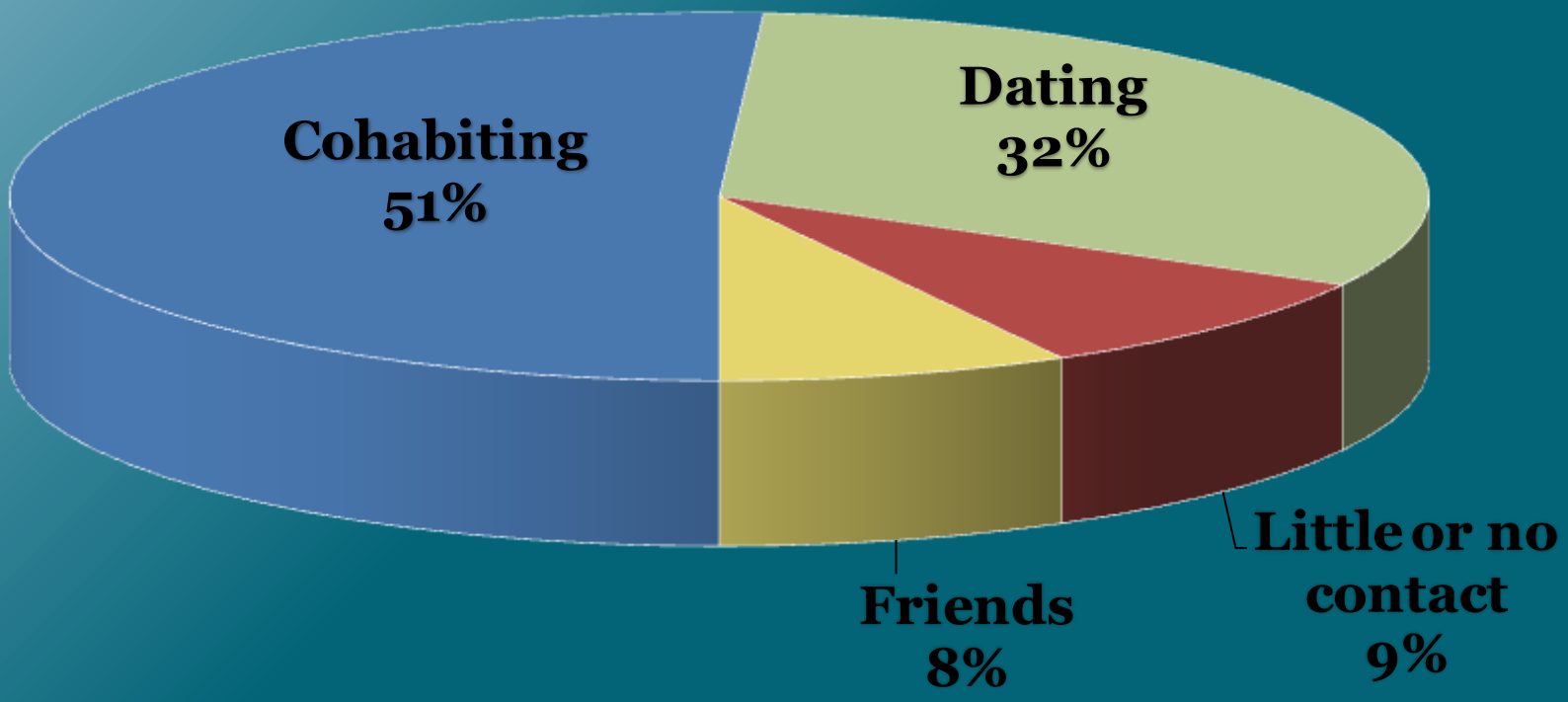
Source: National Center for Health Statistics

UNMARRIED MOTHERHOOD BY EDUCATION



Source: IPUMS Census/ACS

UNMARRIED PARENTS' RELATIONSHIPS (AT BIRTH)



UNMARRIED PARENTS' CAPABILITIES AT BIRTH

As compared with married parents,

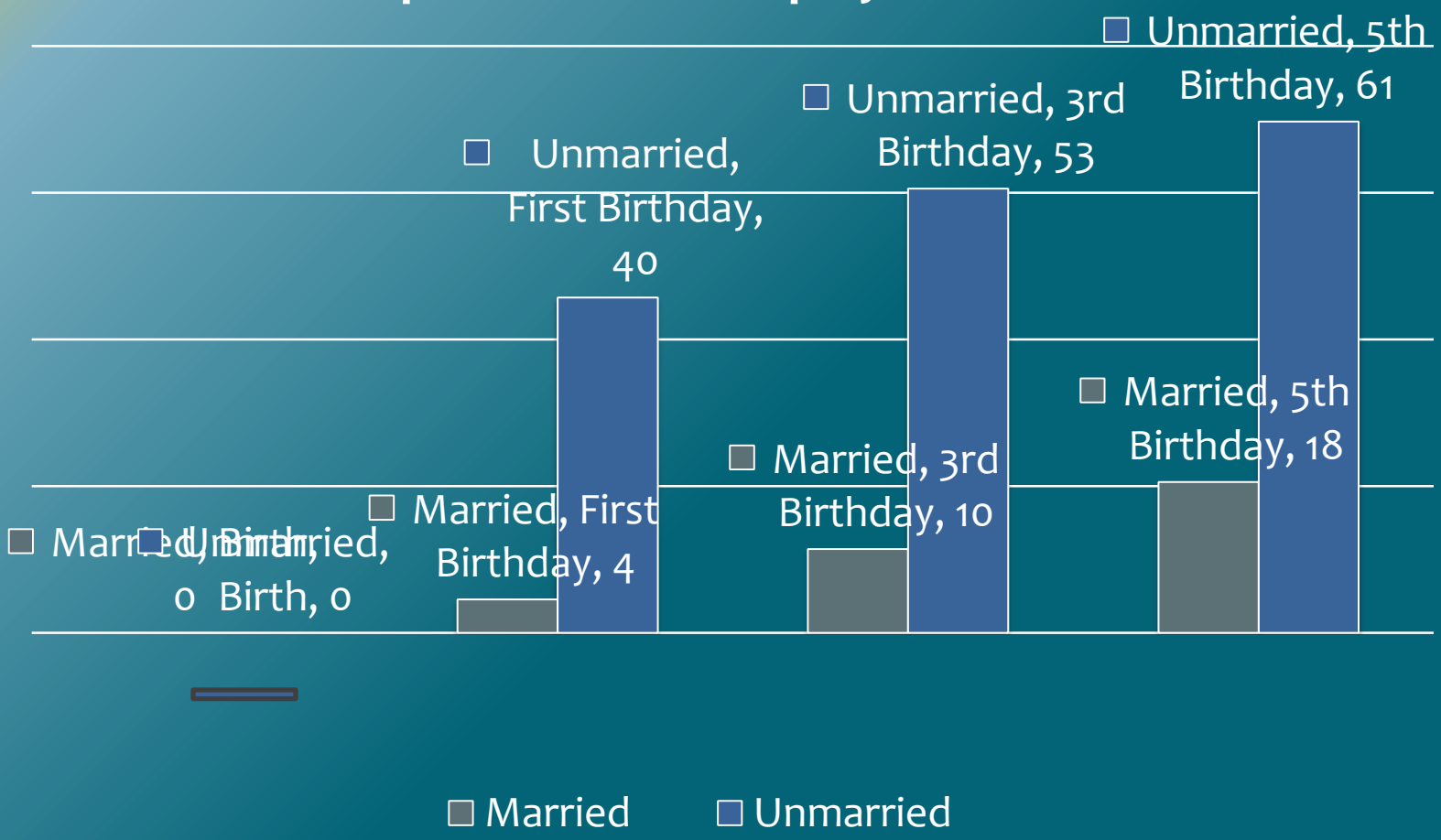
Unmarried mothers are:

- *Younger (23 versus 29)*
- *Less likely to have a college degree (3% versus 30%)*
- *More depressed (15% versus 12%)*
- *More likely to be poor (44% versus 14%)*

Unmarried fathers are:

- *More likely to be unemployed (24% versus 6%)*
- *More likely to have been incarcerated (40% versus 8%)*

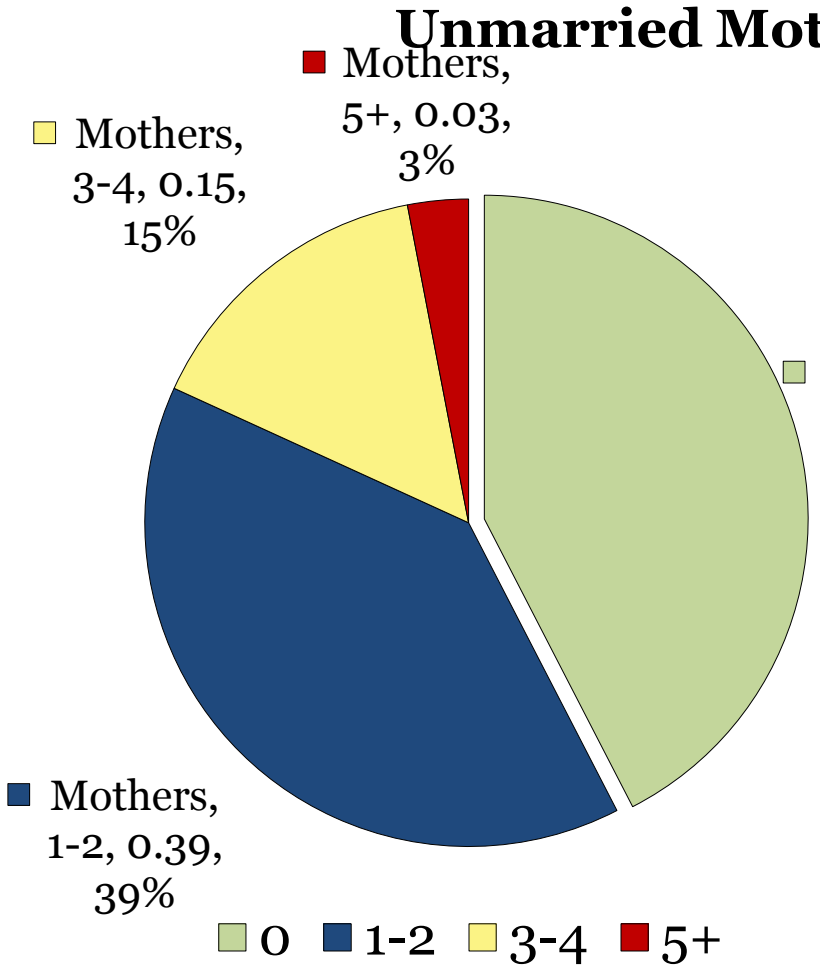
PARENTS' RELATIONSHIP STABILITY



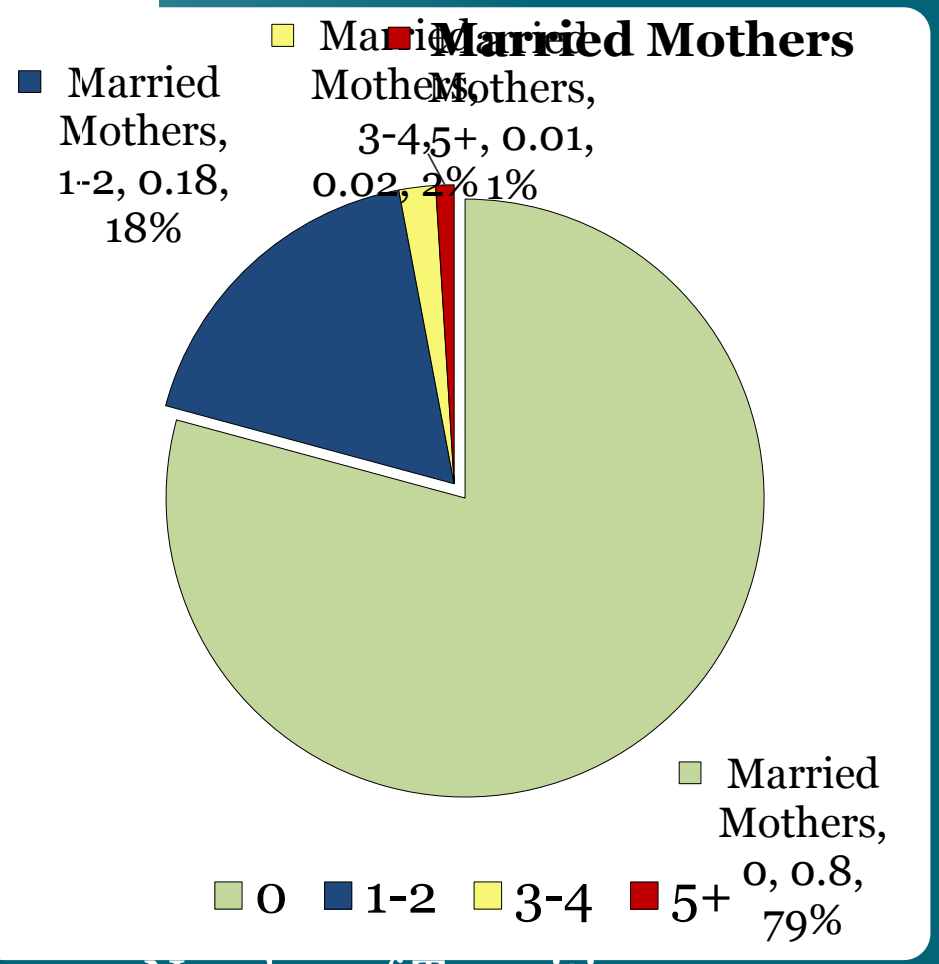
These fragile families live up to their name however, because they are quite unstable. Fully 40% of relationships have ended within the first year after the child's birth, and 61% have ended by the 5th birthday. Marital unions are much more stable in comparison.

Source: Fragile Families & Child Wellbeing Surveys Waves 1-4.
Sample restricted to couples who were in a relationship at the child's birth.

Relationship Transitions by Age Five

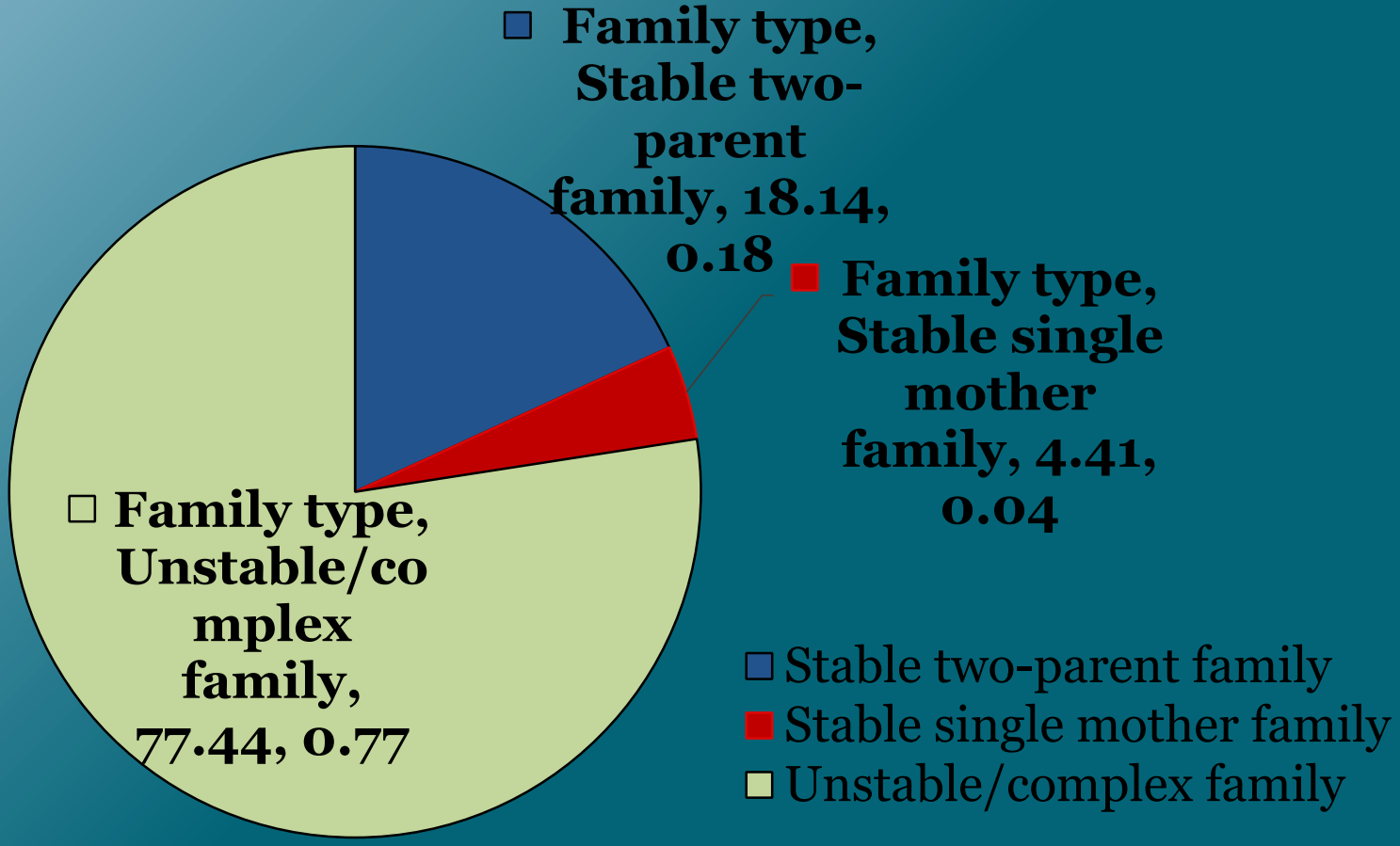


Number of Transitions



Number of Transitions

INSTABILITY AND COMPLEXITY COMBINED



Unstable/complex families are defined by mothers who report any mpf for themselves or the father OR any partners other than the baby's father at the 1, 3, or 5 year surveys or who broke up a residential relationship with the father by the 5 year survey. (all this is spelled out in a few slides)

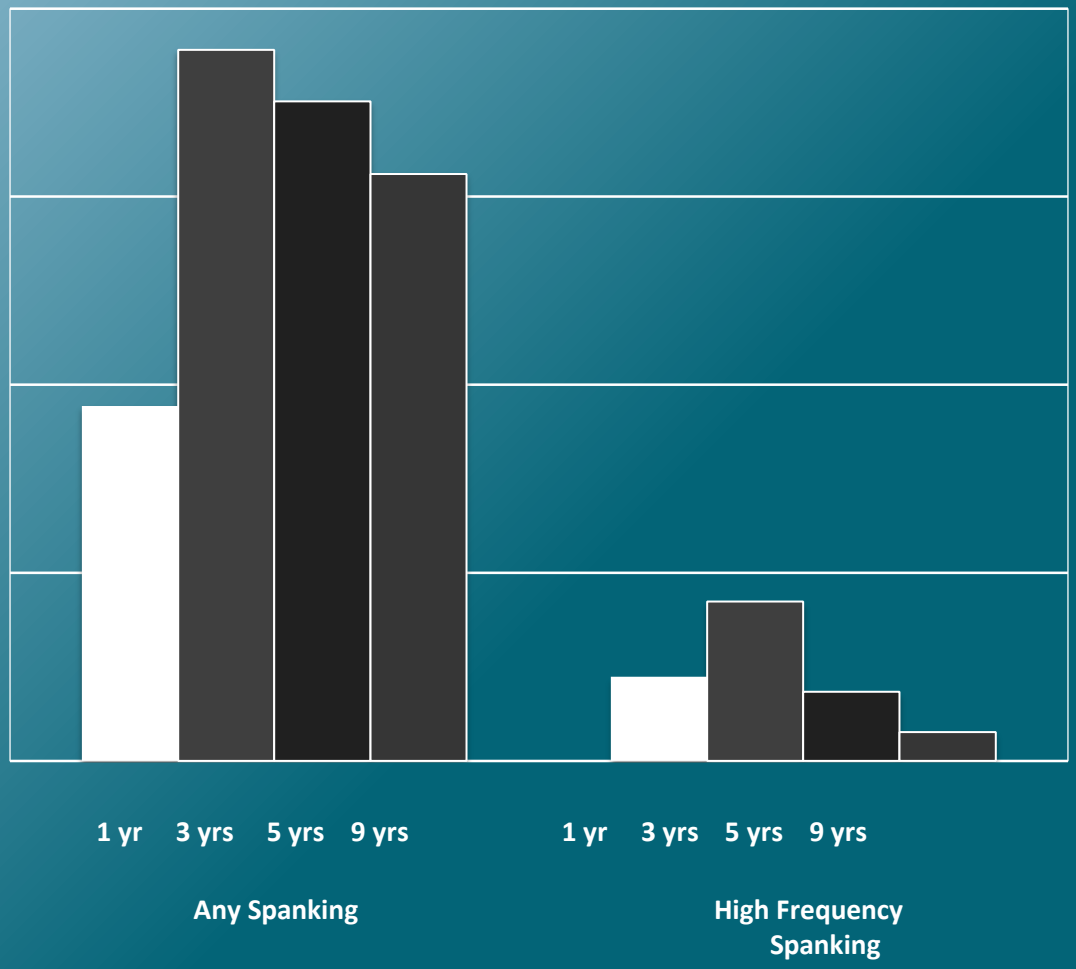
CHILD OUTCOMES AT AGE FIVE

As compared with children born to married parents, children born to unmarried parents have:

- *Lower scores on cognitive tests*
- *More mental health problems*
- *More physical health problems (asthma and obesity)*

- *Net of differences in resources at birth*

III. Harsh Parenting



** Rates of any use of maternal spanking in the past month or high frequency use of spanking in the past month (2 or more times per week at ages 1, 3, and 5, and more than 20 times a year at age 9). From Fragile Families and Child Well-Being Study, birth cohort from 20 cities. MacKenzie, Brooks-Gunn et al., under review.*

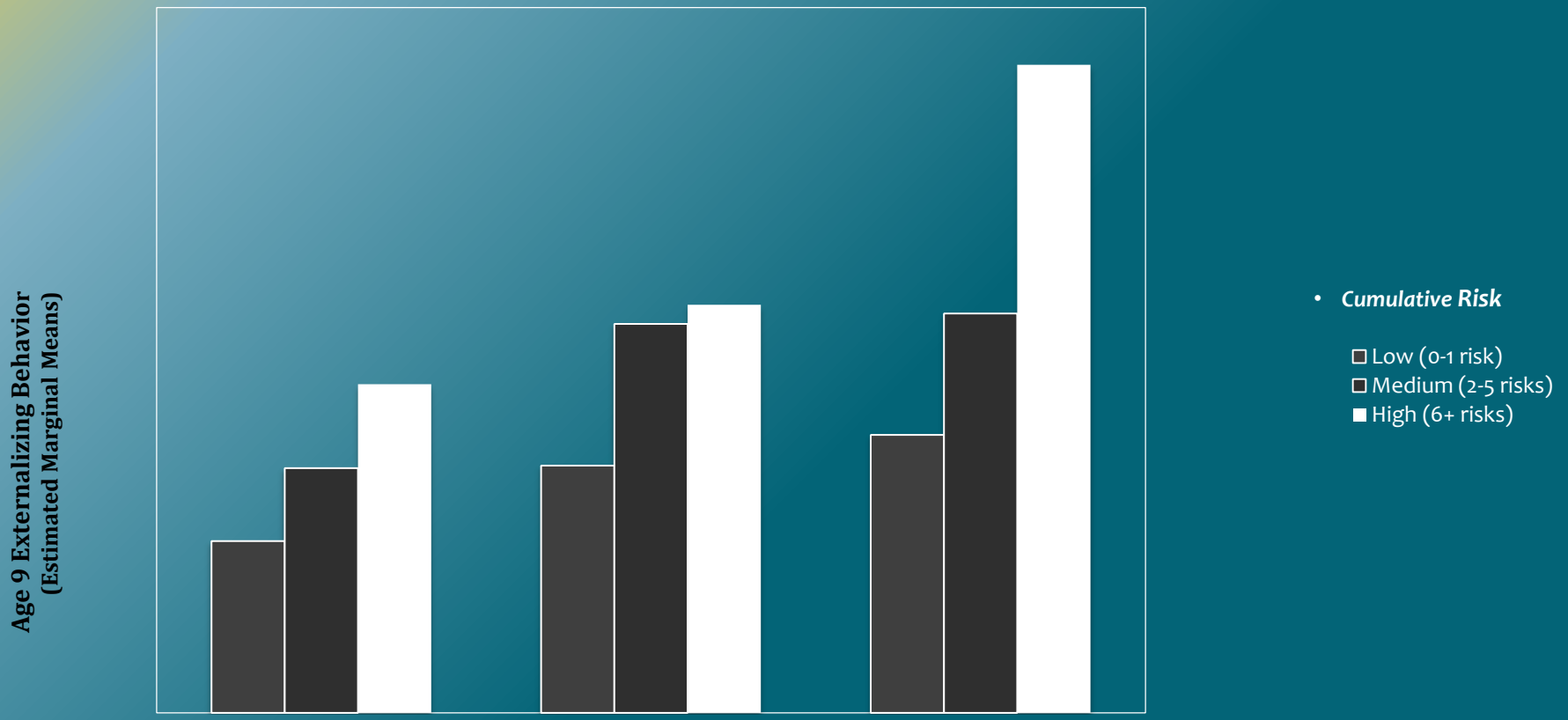
** 13% had high frequency spanking at one wave 6% at two or more waves*

CORRELATES OF HARSH PARENTING

- *Ages 1 and 3*
  - *Boy*
  - *Low birth weight*
  - *Low income*
  - *Parental stress*
  - *Not being Hispanic-American*
- *Age 9*
  - *Boy*
  - *Parental stress*
  - *Smoking and drinking during pregnancy*
  - *Number of children*
  - *Prenatal violence*
  - *Late prenatal care*
  - *No support from dad during pregnancy*

From Fragile Families, MacKenzie, Brooks-Gunn et al., under review. Twenty co-variates were entered into the regressions, including income, education, family structure, ethnicity, immigration, stress and depression, prenatal factors, violence.

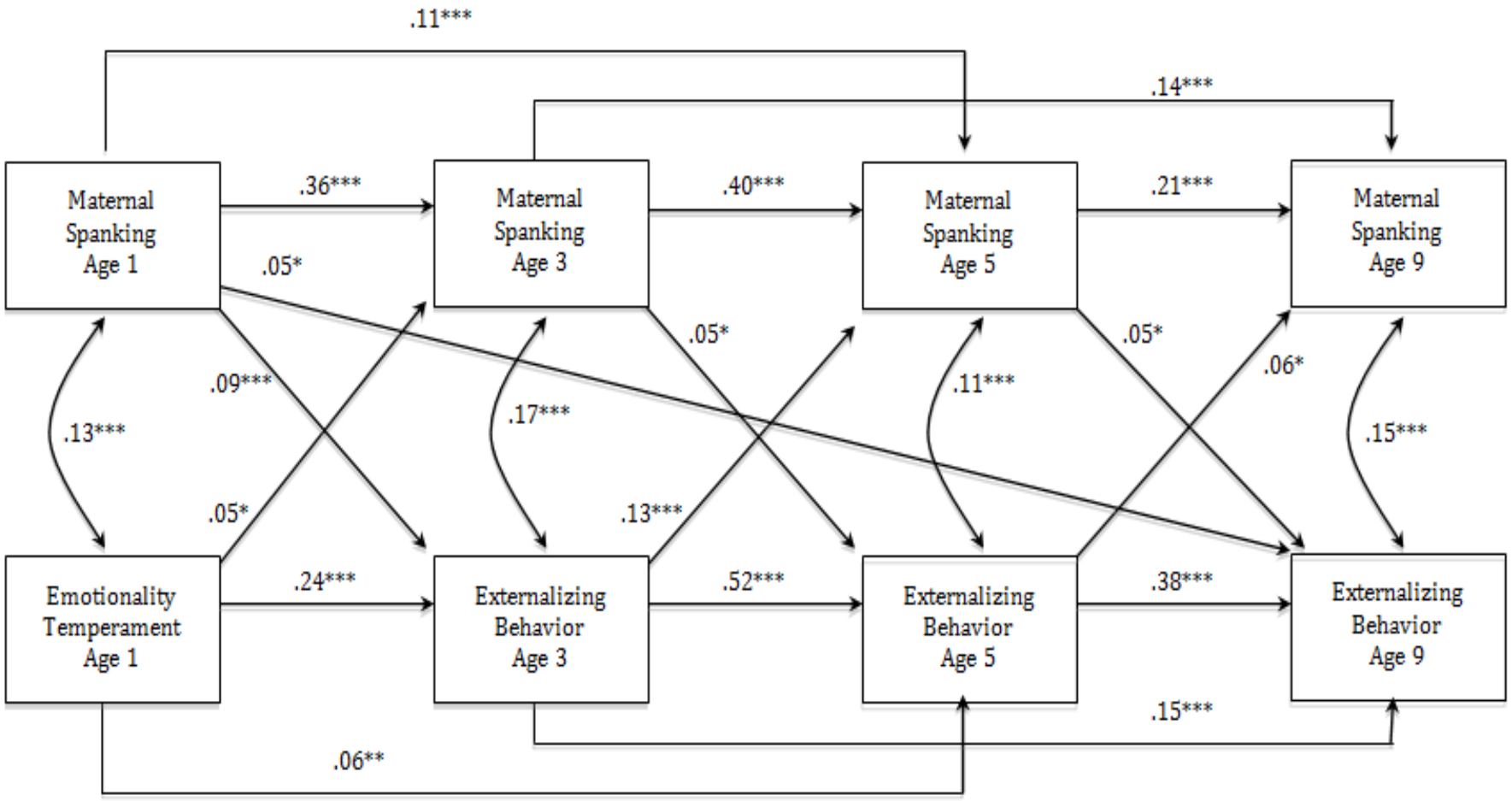
FREQUENCY OF SPANKING



From MacKenzie, Broos-Gunn et al., Under Review

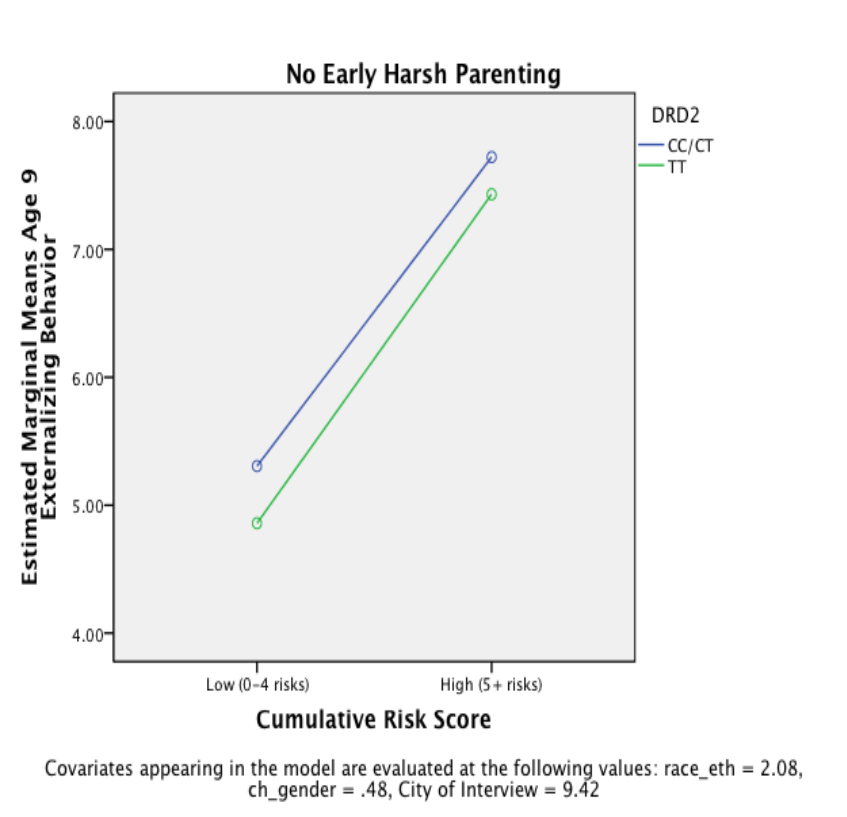
The association between the effects of repeated harsh parenting over four assessment waves (Number of waves of frequent spanking across ages 1, 3, 5, and 9 years) across the first decade with externalizing behavior outcomes at age 9 as moderated by early cumulative risk score (In addition to the inclusion of the cumulative risk index, the model further controls for gender, race/ethnicity, and city of residence).

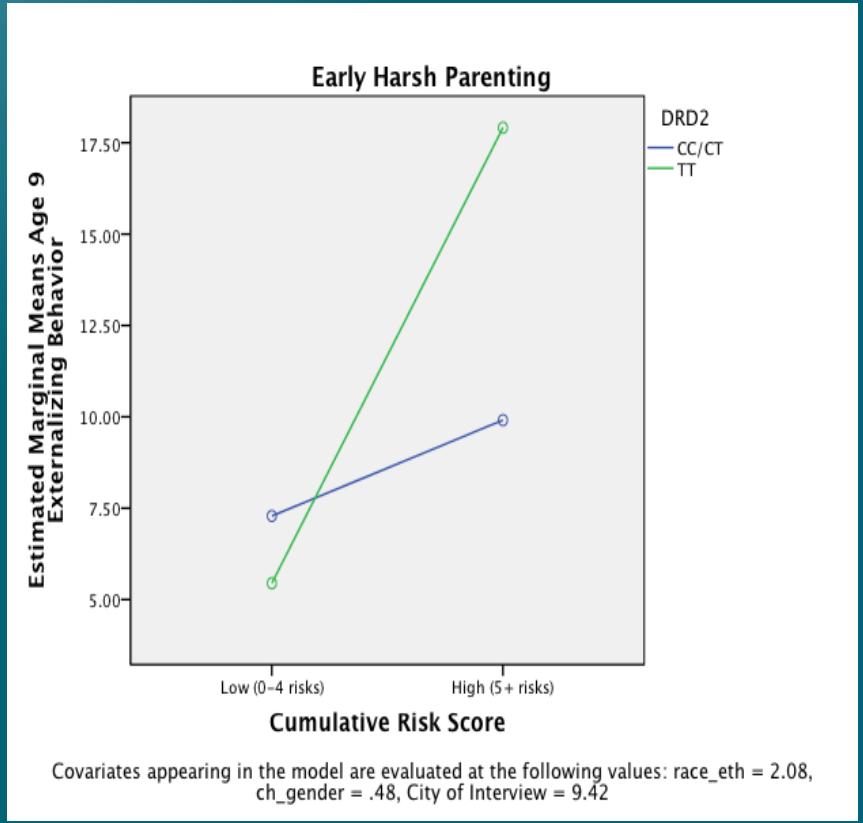
BI DIRECTIONAL EFFECTS OF MATERNAL SPANKING AND CHILD AGGRESSION: INFLUENCES OF MATERNAL AND CHILD GENES



Results from a cross-lagged SEM path model from age 1 through 9 for maternal spanking and child behavior. Values shown are standardized coefficients and covariance is indicated by curved line with double-headed arrow. Model controls for influence of child gender, city of residence, and a cumulative risk index score on spanking and child behavior at each wave (n = 1,874; * p < .05, ** p < .01, *** p < .001).

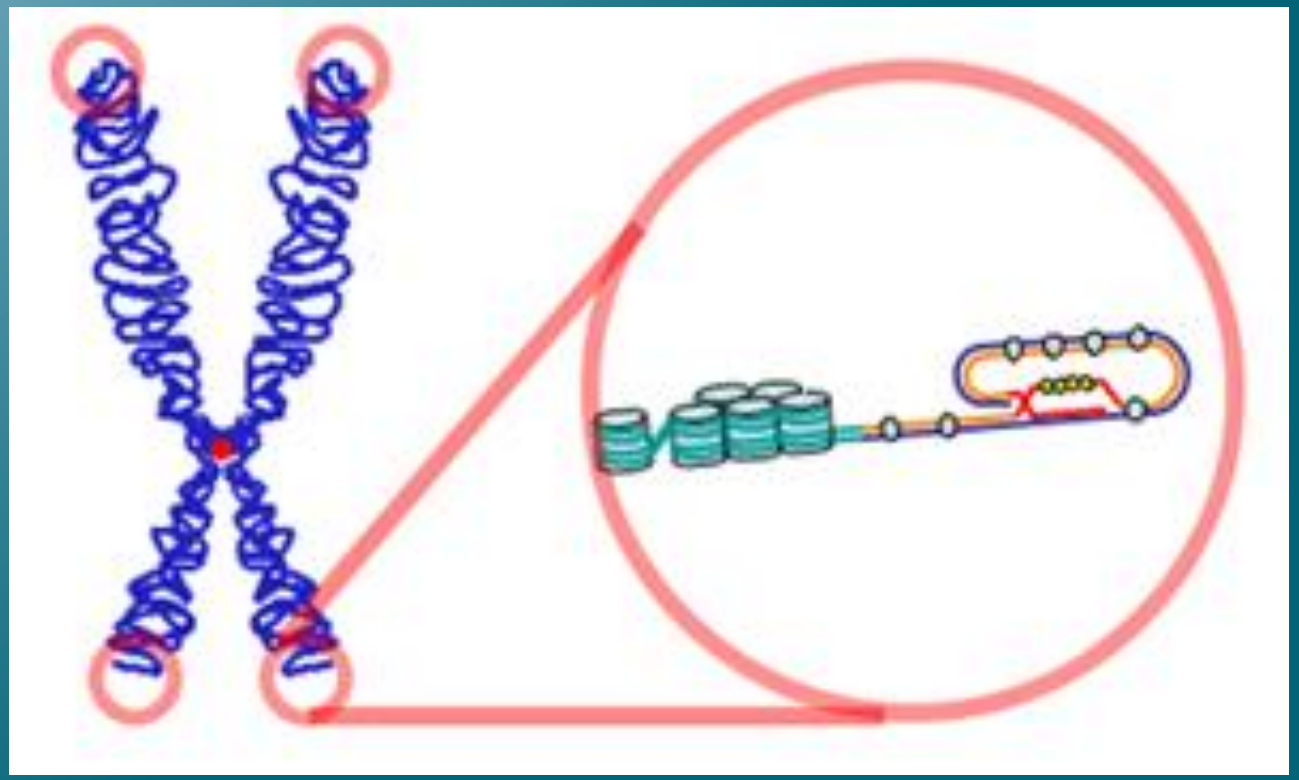
BIOLOGICAL PROCESSES AS MODERATOR





From Fragile Families, MacKenzie, Brooks-Gunn et al., in press. .

IV. TELOMERES AS A MARKER OF STRESS



TELOMERE LENGTH

- *DNA collected from children at Age 9*
- *Quantitative Real-Time PCR (O'Callaghan and Fenech 2011; O'Callaghan et al. 2008)*
- *Absolute Telomere Length*
- *Normalized across Plates*
- *Ln(telomere length in kilo-base pairs)*

FAMILY LIFE AND TELOMERE LENGTH IN AFRICAN AMERICAN BOYS WHO ARE 9 YEARS OF AGE

- *40 Boys*
- *Selected to represent two extremes of family environment*
- *Outcome is Telomere Length at age 9*
- *Tested interactions with sensitive alleles from gene markers in dopamine and serotonin systems*
- *Evidence that Telomere Length is shorter for boys in harsh family conditions if sensitive alleles present*

(published in PNAS, 2014; Colter Mitchell, Dan Notterman, Jeanne Brooks-Gunn, Sara McClanahan, Irv Garfinkel and others)

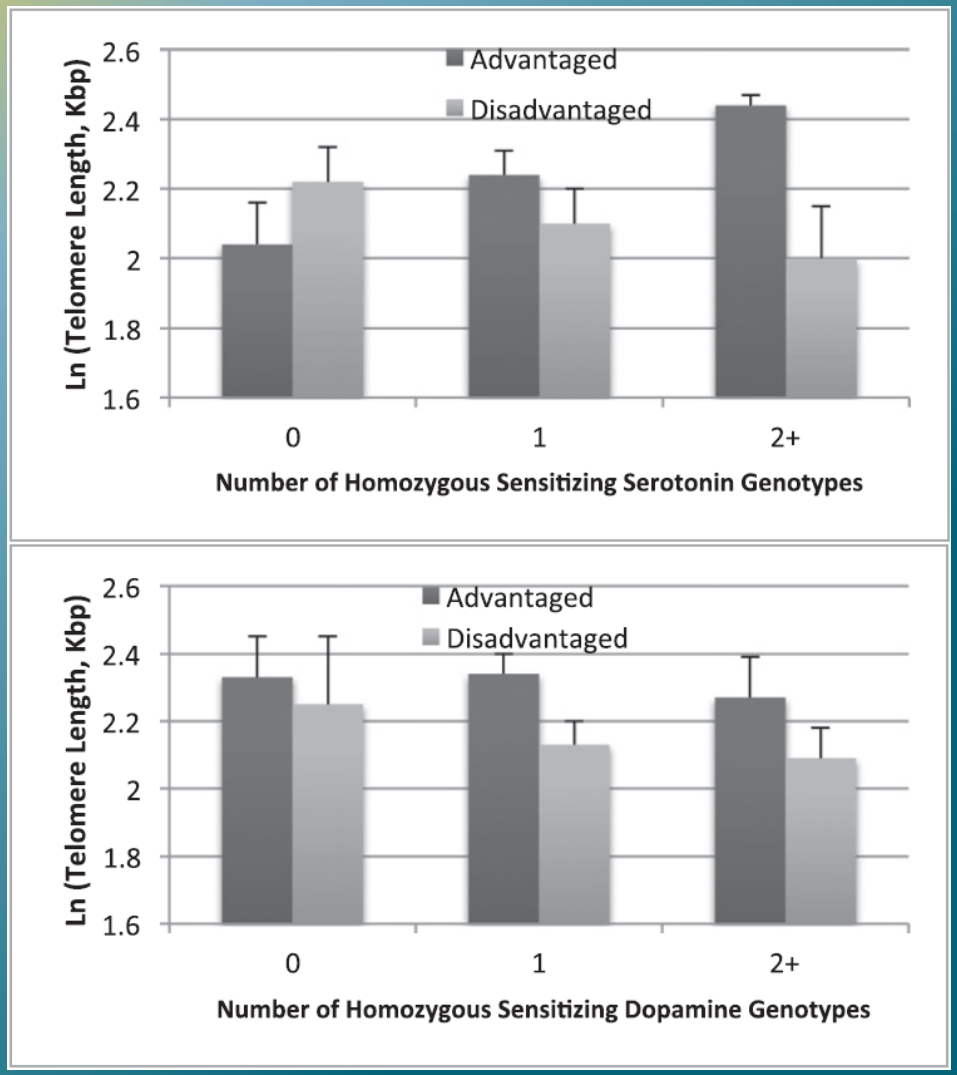
ROBUST REGRESSION ESTIMATES OF SOCIAL PREDICTORS OF LOG TELOMERE LENGTH

	ln(TL)				
Measure	Model 1	Model 2	Model 3	Model 4	Model 5
Harsh environment	−0.19*				
Average income/needs ratio		0.05*			
Harsh parenting index			−0.03		
Family structure changes					
Two-parent					
Single mother				−0.21	
One transition				−0.12	
Multiple transitions				−0.40*	
Mother's education					
Less than high school					
High school					0.32**
At least some college					0.35**

*$P < 0.05$, **$P < 0.001$, one-tailed.

Source: Table 2. Mitchell, C., Hobcraft, J., McLanahan, S., Rutherford Siegel, S., Berg, A., Brooks-Gunn, J., Garfinkel, I., Notterman, D. (forthcoming). Social disadvantage, genetic sensitivity, and children's telomere length. Proceedings of the National Academy of Sciences. doi:10.1073/pnas.1404293111

LN (TELOMERE LENGTH) BY ENVIRONMENT TYPE AND SEROTONIN PATHWAY (UPPER PANEL)AND DOPAMINE PATHWAY (LOWER PANEL) HOMOZYGOUS GENOTYPE COUNTS.



In (telomere length) by environment type and serotonin pathway (Upper) and dopamine pathway (Lower) homozygous genotype counts. Although the possible range of homozygous genotypes was 0–4, due to the small number of minor allele frequencies the range is top-coded at 2+. For the serotonin pathway genotypes, the environment effect is borderline for 0 genotypes (P = 0.09), not significant for 1 genotype (P = 0.32), and significant for 2+ genotypes (P = 0.02). For the dopamine pathway genotypes, the environment difference is not significant for 0 genotypes (P = 0.63), significant for 1 genotype (P = 0.05), and borderline for 2+ genotypes (P = 0.08).

Source: Figure 1. Mitchell, C., Hobcraft, J., McLanahan, S., Rutherford Siegel, S., Berg, A., Brooks-Gunn, J., Garfinkel, I., Notterman, D. (forthcoming). Social disadvantage, genetic sensitivity, and children's telomere length. Proceedings of the National Academy of Sciences. doi:10.1073/pnas.1404293111

TELOMERE LENGTH AMONG CHILDREN OF U.S. AND FOREIGN-BORN LATINA MOTHERS

- *Immigrant Health Average*
- *Intergeneration Transmission of Health*
  - *Maternal Health Selectivity*
  - *Maternal Behaviors*
  - *Maternal Stressors*
  - *Child Stressors*
- *338 Children at age 9 with Latina mothers*
  - *Two-thirds U.S. born mothers*
  - *One-third foreign born mothers*

(Brandon Wagner, Douglas Massey, Sara McLanahan, Jeanne Brooks-Gunn, Dan Notterman and others)
(Preliminary analyses; do not cite)

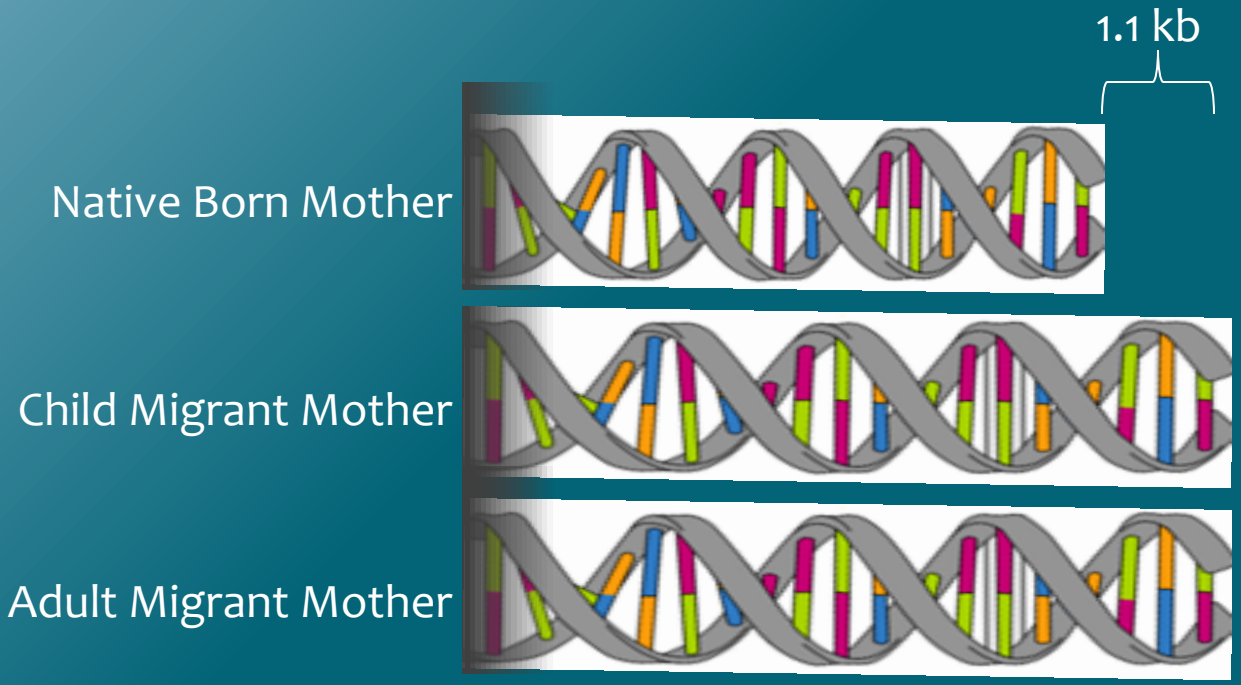
RESULTS

Relative to Native Born Mothers:

*Foreign born mothers; B=.12**

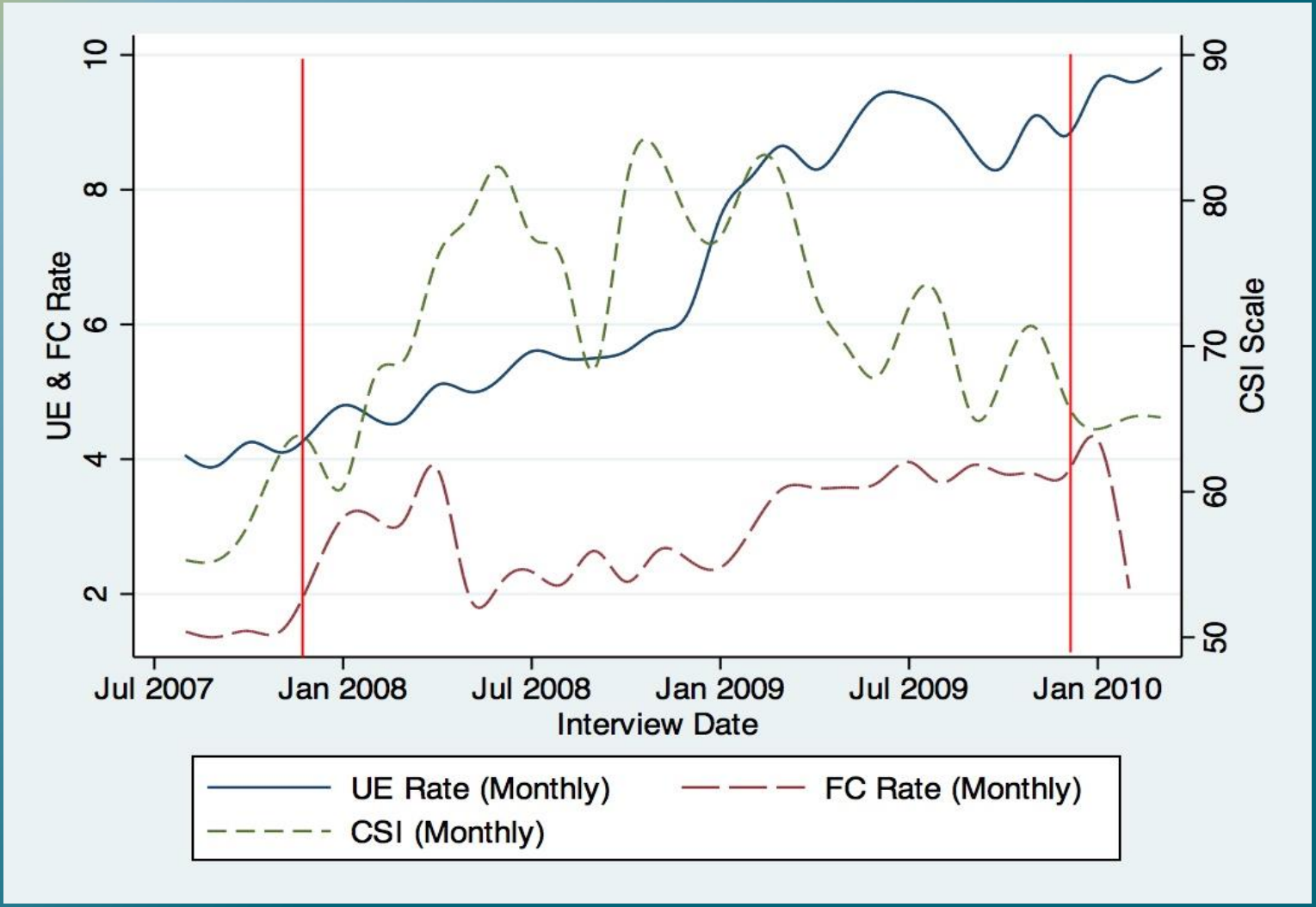
*Mother Entered the US Before 18: B=0.11**

*Mother Entered the US After 18: B=0.12**



+ p<0.1; * p<0.05; ** p<0.01; *** p<0.001

V. THE GREAT RECESSION & PARENTING

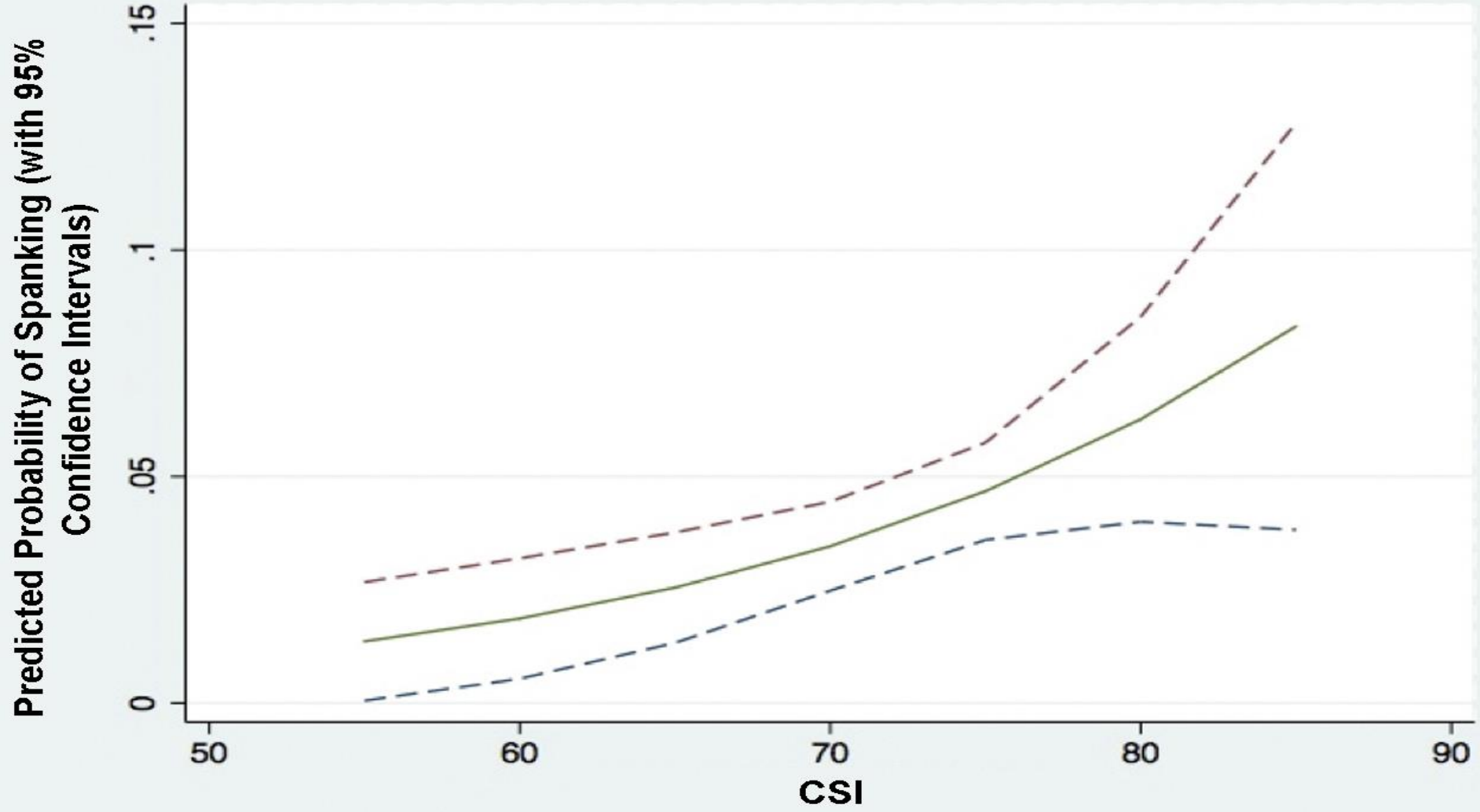


MEASURE OF GREAT RECESSION

Consumer Sentiment Index (CSI)

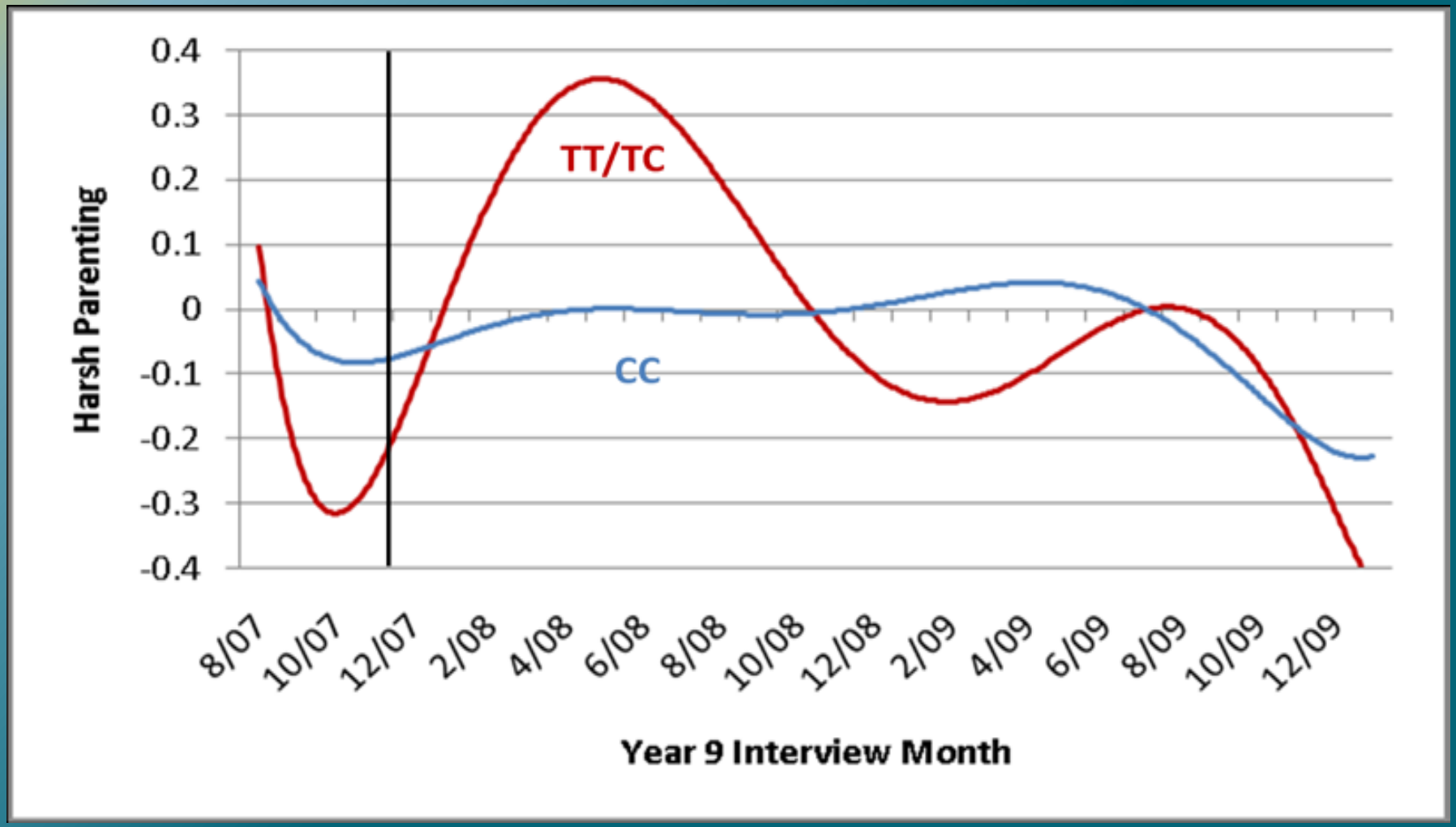
- Monthly level of consumer confidence at national level
- From University of Michigan/Thompson Reuters
- Primarily measures consumer response to news of economic conditions through national level media and local and personal experiences in the labor market (Zagórski &McDonnell, 1995; Throop, 1992; Domes & Morin, 2004).
- **Leads other macro-economic indicators by 3 months (Throop, 1992)**
- Normalized to have value of 100 in Dec. 1964
- Reverse coded so that high CSI is bad

THE GREAT RECESSION & THE RISK FOR CHILD MALTREATMENT



Biological Processes as Moderator

HARSH PARENTING DURING THE GREAT RECESSION BY GENETIC SENSITIVITY



T variant is sensitive variant

From Lee, Brooks-Gunn et al., 2013. Fragile Families

EXTERNALIZING & INTERNALIZING

Table 1a. CSI and Child Externalizing & Internalizing Behaviors: Coefficients from OLS Regression

	Boys	*Girls*	*Boys*	*Girls*
Consumer Sentiment Index	0.10+	-0.09**	0.11*	-0.04
N	716	688	717	686

DRUGS/ALC. USE & VANDALISM

Table 1b. CSI and Child Self-Reported Drug/ Alc. Use & Vandalism: Odds Ratios from Logistic Regression

	Boys	*Girls*	*Boys*	*Girls*
Consumer Sentiment Index	1.09+	0.91*	1.05*	0.99
N	1,014	957	1,011	932

EXTERNALIZING & INTERNALIZING

Table 2a. CSI and Child Externalizing & Internalizing Behaviors Among Children of Married/ Cohabiting Mothers: Coefficients from OLS Regression

	Boys	*Girls*	*Boys*	*Girls*
Consumer Sentiment Index	-0.02	-0.05	0.00	0.02
N	295	280	303	281

	Boys	*Girls*	*Boys*	*Girls*
Consumer Sentiment Index	0.18*	-0.11*	0.18**	-0.07
N	404	281	717	686

WHERE TO INTERVENE?

- *Human and Economic Capital*
  - *Family Income*
  - *Parental Education*
  - *Neighborhood Conditions*
  - *National Economic Conditions*

- *Family Life*
  - *Harsh Parenting*
  - *Emotional Health of Parents*
  - *Stimulating Activities and Materials*

- *Child*
  - *Achievement and Cognition*
  - *Behavior Dysregulation*

Most of the literature to be discussed is based on experimental evaluations using randomization. A few important policies have not been subject to randomization; for example, parental leave policies and the earned income tax credit.

APPENDIX

INTERVENING ON FAMILY INCOME

- *Provide additional income with no requirements*

  Income experiments

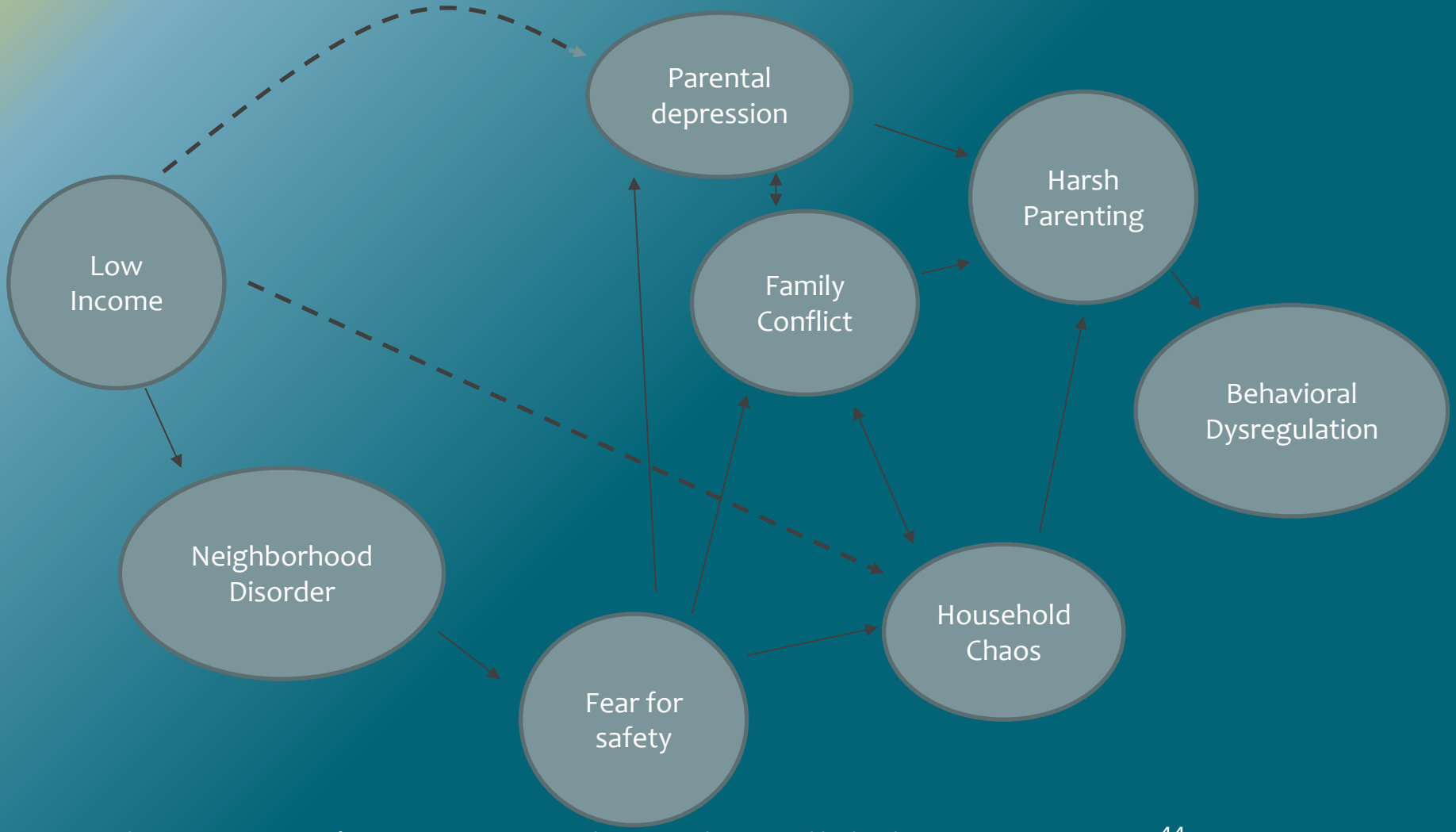
- *Provide additional income if employed*

  (Manpower Demonstration Research Corporation)
  U.S. Welfare Reform Experiments
  Canadian Self Sufficiency Experiment

- *Provide housing subsidy*

  (Brooks-Gunn, Gaumer, Muenning, Rundle)
  New York City Housing and Neighborhood Experiment
  China Housing and Neighborhood Experiment

BRINGING NEIGHBORHOODS INTO MODEL



Barajas & Brooks-Gunn, In Press; Data from Project on Human Development in Chicago Neighborhoods

Increasing Family Income

- Increase education and credentials
- Increase work force participation
- Land higher paid jobs

(work programs, EITC, 2 and 4 year colleges, credential programs)

Reducing Family Stress

- Help families get food, health care, child care
- Alleviate parental mental health distress
- Reduce maternal depression, anxiety, and substance use
- Reduce family instability
- Alter parenting behavior

PROGRAMS TO REDUCE FAMILY STRESS

- Case workers
- Friendly visitor
- Mental health services
- Parenting programs
- Marriage promotion programs

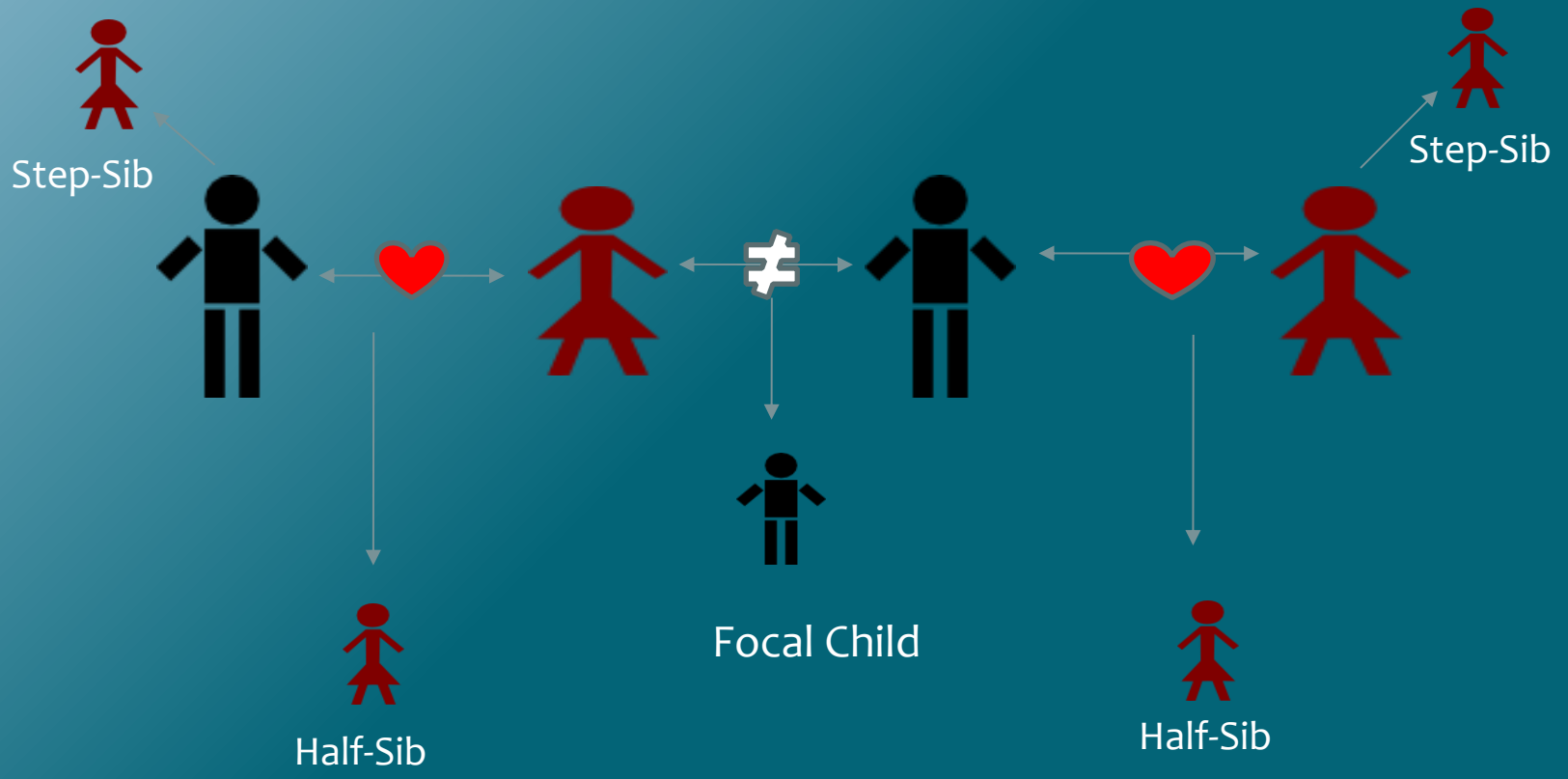
Altering Children's Experiences

- Increase time spent hearing language
- Increase time spent in cognitive stimulating activities
- Decrease time in chaotic environments
- Increase training in regulation

Programs which alter experiences

- Language oriented parenting programs
- Educationally oriented child care
- Preschool education programs

NEW RELATIONSHIPS AND FAMILY COMPLEXITY



UNMARRIED FATHERS' INVOLVEMENT

	Year 1 (%)	Year 3 (%)	Year 5 (%)
All fathers			
Lives with child	51	42	36
Non-resident fathers			
Saw child in past year	88	78	72
Saw child in past month	63	55	51

I.